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National Paper
of the
Yemen Arab Republic
(First Draft)

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NATIONAL PAPER OF THE YEMEN ARAB REPUBLIC*

(First Draft)

INTRODUCTION

The Yemen Arab Republic attributes great significance to the United Nations Conference on the Application of Science and Technology. As one of the developing countries, Yemen is keenly aware of the crucial role played by science and technology in the promotion of socio-economic development. Before proceeding to the substance of the National Paper it would seem appropriate to present a general picture of the socio-economic conditions prevailing in Yemen.

When the Yemeni Revolution took place in 1962 it inherited a backward society, a shaky economy with no infrastructural support, a polity with none of the perquisites of the modern state and a country that was just emerging from its quasi-total isolation from civilization. The Revolution mustered all its forces in the attempt to break the bounds of backwardness and to lay the foundations of a modern centralized state in all its political, administrative, social and economic constituents.

Naturally, this was not to be an easy task, considering the enormity of the inherited backwardness and the paucity of the resources available for breaking it. Nevertheless, the Yemeni people were able to transgress the difficulties and make progress towards the aspired objective. In the first eight years of the Revolution the Government's best efforts were diverted to the task of safeguarding the liberty and independence of the country at the expense of its socio-economic transformation. With the return of peace and stability to all parts of the country at the beginning of 1970, however, the efforts of the Yemeni people turned once again to confront this all-important challenge.

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The Government decided upon the scientific planning method as the most effective approach to promoting the objectives mentioned above. Accordingly, it adopted a socio-economic plan for the transformation and development of the Yemeni economy and the elevation of its social and cultural standards.

Since the application of science and technology to development has to take into account the circumstances of the country and its socio-economic environment, it is essential to touch, however briefly, upon those characteristics of the Yemeni economy - its bottlenecks and its major features - in whose light the government's conception of the application of science and technology to development will be shaped.

The Yemeni economy shares many features with the economies of the other developing nations, such as low per capita income, basic reliance on the agricultural sector, widespread illiteracy, and low capital formation. In addition to these shared features, the Yemeni economy has a number of unique qualities that distinguish it from the rest of the developing countries. Among the more important of these qualities are the following:

(a) The geographic dispersion of the country and the communications difficulties imposed by the nature of the terrain;

(b) The succession of unfavourable weather conditions;

(c) The total isolation of the country prior to the Revolution of 1962 and the abruptness of the country's opening to the modern world following the Revolution;

(d) The civil war which sapped the strength of the Government and its resources and which interfered with the transformation and development process in the country.

Despite the real progress made by the Yemeni economy after the Revolution, the country still suffers from numerous bottlenecks and difficulties that form stumbling blocks in the way of comprehensive development. The following represent some of the more serious of these bottlenecks:

(a) The infrastructural weakness of all aspects of life and society - communications, roads, health services, education;

(b) The scarcity and paucity of qualified personnel in different fields who are trained well enough to assume responsibility for administrative and technical tasks and to lead the transformation and development process;

(c) The weakness of the administrative apparatus in all sectors and at all levels, especially in the departments of the state.

Awareness of the realities of the Yemeni situation and the diagnosis of its defects and its remedies suggests that the following may sum up the major objectives of the coming stage of development:

(a) The construction of a strong economic infrastructure in terms of roads, buildings, utilities and services;

(b) Development of the construction and contracting sector;

(c) The establishment of an integrated educational, cultural and training system;

(d) The construction of an advanced agricultural-industrial economy;

(e) The mobilization of human resources;

(f) The construction of a modern state.

Thus far we have attempted to identify the major features of the Yemeni economy, including the obstacles and bottlenecks that stand in the way of its development.

I. OUTLINE OF THE ITEMS OF THE NATIONAL PAPER

The remainder of the Yemen Arab Republic's National Paper embodies a discussion of the items of the United Nations Conference on Science and Technology. After diagnozing the realities of science and technology in Yemen, remedies are suggested at the national, regional and international levels, based on an objective study of the following sectors:

A. Food and Agriculture.
B. National Resources.
C. Health, Housing and the Environment.
D. Transport and Communications.
E. Industrialization, including the production of capital goods.

A. Food and Agriculture

The agricultural sector in Yemen is still the major economic sector, contributing about 50% of the country's GDP. It is also the country's most backward economic sector. The extent of the backwardness in agricultural productivity is indicated by the fact that while this sector accounts for 50% of the country's GDP, it employs 73.3% of the country's working labour force.

Agricultural produce make up about one half the country's exports. External trade figures reveal the extent to which domestic agricultural production is incapable of meeting domestic consumption needs; for agricultural imports are about sixteen times greater than agricultural exports.

Table No. 1 shows the degree of technological dependency and the level of technology in application in this sector.

Table No. 1[a]

Area of Activity	Degree of Dependency			Level of Technology		
	High	Medium	Low	Normal	Advanced	Sophisticated
Agricultural technology	X			H		
Food	X	X		H	H	
Fish		X	X	L	H	
Food storage and processing		X		H	H	

[a] Explanation of the symbols: The letter "H" opposite "Agricultural technology", and under "Normal" Level of Technology, for example, means that the degree of dependency in agricultural technology of the "normal" level is "high".

The major determinant of the present configuration as depicted in the Table above is the absence in the agricultural sector of much of the infrastructure needed for stimulating the agricultural development process, including, in particular, the absence of specialized institutions devoted to the acquisition of modern science and technology. For example, the factors that make for improvement and increase in production, such as chemical fertilizers, improved seeds and farm machinery, are in extremely limited use at the present time.

The major stumbling blocks in the way of development in this crucial sector can be summarized as follows:

(a) Untapped sources of irrigation and near-total dependence on rainfall;

(b) The isolation of production centres from marketing centres due to the absence of good roads;

(c) Acute shortage of trained personnel, especially in the technical and the administrative spheres;

(d) Lack of essential data and information, such as maps and agricultural statistics;

(e) The low level of technology employed in agricultural development.

Most agricultural tasks rely completely on human or animal effort without the support of even the simplest of farm machinery, the seeds of most crops have not been touched by selection or improvement processes, and the use of chemical fertilizer is still in its beginning stages.

Recommendations:

The transfer of technology and its adaptation to the agricultural sector is not a very complex operation because most agricultural technology is of a simple nature. Technology transfers and their application to the promotion of agricultural development can be increased appreciatively if the following factors are supplied:

(a) Organizations trained in agricultural counselling and systematic procedures for supplying agricultural requirements;

(b) Capital and credit facilities for farmers;

(c) Receptivity of farmers to the acquisition and use of new technologies;

(d) Support and expansion of agricultural research stations;

(e) Linkage of basic and applied research to agricultural development operations.

On the regional and the international level, the Yemen Arab Republic is convinced that co-operation among the developing countries in the transfer and application of technology in the agricultural as well as the other sectors is a crucial necessity. Yemen has concluded numerous bilateral and international agreements in this regard. The clearest testimony to its interest in co-operation at this level is the presence in the country of hundreds of Arab and foreign experts in the different disciplines, who participate in the variety of scientific and technical fields related to the application of technology to agricultural development. Yemen stands firmly behind all efforts to consolidate scientific and technological co-operation in this area and particularly in the exchange of experts and information.

3. Natural Resources and Energy

A large number of foreign interests are engaged in prospecting for petroleum, minerals and ground water. Some of these explorations form part of space programmes that cover the planet with the use of artificial satellites. Of the results of these explorations Yemen only receives those data that are collected locally with the participation of the Yemeni Government and included in the on-site reports submitted. Apart from these explorations and the procurement of raw materials for the cement plant, there are no other applications of science and technology to the exploitation of natural resources in Yemen. Stone quarrying and cutting for construction purposes are worked using primitive, mostly manual, techniques. Mechanical stone crushers are employed for aggregating the stones used in road construction and in making concrete. The characteristics of the Yemeni soil that is used in the construction of numerous multi-story buildings (up to seven stories) have not yet been subjected to scientific investigation to determine its usefulness as a building material appropriate to Yemeni conditions.

Yemen is generously endowed with water resources that are replenished periodically with an annual rainfall of between 300 and 1000mm falling on over one half the surface area of the country. No scientific applications have been made to the development and management of water resources, with the exception of the measures taken by a number of foreign companies within the framework of their specific projects.

Solar energy is plentiful in Yemen because of the country's proximity to the equator. This form of energy is used in a rather elementary fashion for conditioning the inside temperature of buildings. Architectural form has responded to this factor by designing thick and heavy walls with a high capacity for absorbing the heat of the sun, which is then released to warm the inside of the building during the night. The availability of daily sunshine (with rare exceptions) and the proximity of Yemen to the equator make of this country one of the most likely candidates in the world for the fruitful development of solar energy as a safe, non-polluting and unlimited energy source. Now, Yemen is not an oil-producing country. Its natural resources and economic conditions

oblige it to price the unit of electricity (KWH) at 65 fils to the consumer (65 fils = 14 U.S. cents). As this is a very high price, the development of solar energy in Yemen ought to have a high chance of success when compared with countries where, despite the fact that the cost of the unit of electricity to the consumer is no more than 5 cents per KWH, the authorities wish to develop solar energy as an economically comparable and ecologically competitive energy source.

The fact that Yemen pays a burdensome price to secure its energy needs from traditional sources, the absence of reliable perennial rivers, the low average rainfall that cannot support significant agricultural and industrial growth - these factors, added to the considerations mentioned above, make it imperative that Yemen should seek to develop non-traditional sources of energy. It should be noted in this regard that the application of science and technology ought to take place in the framework of close co-ordination between the field of energy and the field of water resources, as in the desalination of saline ground water and sea water.

The Table below shows the present degree of dependency for the three levels of technological progress in the area of natural resources and energy.

Area of Activity	Degree of Dependency			Level of Technology		
	High	Medium	Low	Normal	Advanced	Sophisticated
Replenishable and non-replenishable natural resources	H		L	L		H
Traditional and non-traditional energy sources	H					
Development and conservation	H		L	L	H	H
National management and utilization	H			H	H	

* The letter "H" under "Sophisticated" Level of Technology indicates a high degree of dependency in the exploration for and development of natural resources conducted by foreign interests with the use of artificial satellites. This is the only instance of the application of scientific or technological effort at the "Sophisticated" level.

Obstacles to Progress:

These obstacles are generally the same as the ones described in the discussion of industrialization. The failure of the foreign interests engaged in exploration and prospecting to co-operate as much as could be desired with local institutions and authorities, however, is a problem that deserves particular attention.

Recommended Solutions:

These also are similar to the recommendations proferred in the discussion of industrialization. Emphasis should be placed, however, on the need for increased co-operation on the part of the developed countries that have international exploration programmes. This could perhaps be promoted through the passage of domestic and international legislation sanctioning fruitful co-operation and prohibiting unfair exploitation.

C. Health, Housing and the Environment

Health-care and public health services in Yemen are to a large extent dependent upon foreign expertise. There is a severe shortage of qualified doctors, medical assistants and nurses. To fill the gap to some extent the Yemeni Government is resorting to the employment of doctors and technicians from Arab and foreign countries and the establishment of hospitals through bilateral assistance agreements.

The Ministry of Health is responsible for co-ordinating health plans and developing the human resources that these plans require, in close co-operation with the United Nations World Health Organization. WHO also supervises the implementation of drinking water projects in the major cities and in the countryside.

Because of rural-urban migration and the increased demand created by the arrival of large numbers of foreign experts, a severe shortage developed in available housing units, accompanied by large increases in rents and construction costs. The Government responded by resorting to the modern technology of constructing pre-fabricated housing units. Around three thousand housing units are presently under construction using this method and the hope is great that they will ease the current housing shortage.

D. The Transport and Communications Sector

The transport and communications sector in Yemen is a huge stumbling block in the way of the socio-economic development of the country. The road network and the means of transport are still quite primitive even when compared with many countries of the Third World. As for the application and adaptation of technology in this vital sector, all the big projects in the country are being implemented by foreign companies on a "turnkey" basis, with no effective participation on the part of local companies.

The following are the major bottlenecks in this sector:

(a) The shortage of qualified cadres sufficiently trained to undertake competent administrative and technical tasks;

(b) Deficiencies in basic infrastructure, such as in the country's utilities and services;

(c) Shortage of the necessary capital;

(d) The topographic composition of the country, which increases the investment costs of domestic technical participation.

Recommended Solutions:

Increasing the number of trained Yemeni technical cadres in this sector will contribute to the solution of some of the problems which the country now faces. It should be recognized, however, that the development of this vital sector in Yemen, as in so many other industrially retarded developing countries, will remain for a long time almost completely dependent on technological imports.

To insure the success of the Yemen Arab Republic's efforts to develop and strengthen its position in the transfer, adaptation and development of technology in the transport and communications sector, the following measures should be taken:

(a) The local institutions and organizations that deal with foreign companies should be built up and their bargaining power enhanced;

(b) Yemen's policy should be co-ordinated with the policies of the other Arab countries through all available channels and organizations, particularly through the establishment of an Arab centre for the transfer and development of technology;

(c) Non-local companies should be requested to make effective contributions to the country's scientific and technical potential and to train the country's skilled labour in sufficient numbers;

(d) Yemen should endeavour along with the other developing countries to have the formulation of the international Code of Conduct on the transfer of technology adopted;

(e) An Arab policy concordant with the policy of the developing countries and the policies of the other countries of the world in relation to the New International Economic Order ought to be formulated.

Roads (Km)*

Types of Road	Base Year (1975-1976)	Fifth Year of the Five-Year Plan (1980-1981)	Rate of Increase (%)
Asphalt	916	1601	75
Gravel	1322	3241	145
Dirt	1840	2401	30
Total	4078	7243	78%

* Discussion of air, sea and rail transport in final version of this Paper.

E. Industrialization and Production of Capital Goods

The electrification and mechanization of Yemen only began to take place, and then in a gradual manner, in the last twenty years of its long history. Before then, Yemeni industry represented no more than a few examples of handicraft activity, which soon began to deteriorate as a result of the competition of imported goods. Because they lacked the minimum theoretical and practical knowledge required, Yemeni craftsmen were unable to apply science and technology to the improvement of their work procedures and their finished goods.

When electricity and machinery were introduced into Yemen in the form of equipment and integrated projects, they were not accompanied by the qualitative and quantitative adjustment capabilities needed for responding to the internal factors operating in the country and to the changes that were being induced therein. The result was an increase in the degree of dependency and its generalization to all economic sectors. The Table below reveals the high degree of dependency that developed in Yemen in the major industrial activities that existed in 1975. Note the absence of any "sophisticated" technological activity as the level and the scope of technological dependency expanded.

Type of Industry	Degree of Dependency			Level of Technology		
	High	Medium	Low	Normal	Advanced	Sophisticated
Food, beverage and tobacco	H			H		
Textile						
Chemical products, wood products and printing	H			H	H	
Non-metallic construction materials		M	L	L	M	
Metal products, jewelry and ornaments			L	L		
Capital goods and equipment	H			H		

Previously, with an import figure close to zero, Yemen lived in a state of near self-sufficiency. One of the factors that reversed the situation and led to its accelerated transformation to the condition of dependency was the increased purchasing power of the population and their receptivity to imported consumer goods. This is a consequence of the sizeable amounts of cash sent by Yemeni workers abroad to their relatives in Yemen or repatriated with them on their return to their villages.

The degree of dependency was considered for the purpose of this Paper, to be "high" when more than 75% of production inputs, such as services and processed raw materials, are imported from abroad, "medium" when the proportion is between 25% - 75%, and "low" when it is less than 25%.

Obstacles to Progress:

The following are some of the major obstacles to progress towards lower degrees of dependency:

(a) The low technological awareness of the planners of industrial projects;

(b) The desire of companies that have their own machinery to link as much of a given industrial project as possible to their machinery and to make the project as dependent as possible on raw materials that they themselves have processed;

(c) Absence of plans for the development and transfer of technology according to sound scientific principles;

(d) Absence of incentives that encourage industrial management to effect technology transfers;

(e) Shortage of trained manpower;

(f) The brain-drain;

(g) The difficulty of selecting technologies that are suitable to local conditions in Yemen and the need to be satisfied with a selection from among the technologies offered on the market, which have usually been developed in answer to conditions prevailing in other countries.

Recommended Solutions:

It is easy to declare that the measures needed for achieving a lower degree of technological dependency consist of the elimination of the obstacles mentioned above and any other obstacles that may crop up; but because Yemen is still at the beginning of the long journey on the road to progress, and in view of the experiences and endeavours of other developing countries, it is possible to assert that this obstacle - removing and solution - finding process is a difficult task indeed.

Among the measures that have to be taken at the national level, the first step should be the creation of a special department or office devoted to the problems of technology transfer and selection. This department should be assigned the responsibility for doing all that is possible locally to remove the aforementioned obstacles, beginning with an informational campaign to promote greater awareness of these questions and the careful scrutiny of the human elements who are assigned responsibility for effecting technology transfers through project planning and implementation agreements and bilateral assistance agreements. It should have the responsibility for recommending what items need to be confirmed, amended or added, supervising their implementation and ascertaining their usefulness. On the regional and international levels there is little that Yemen can do other than to participate in collective decisions and to implement them jointly with other countries - given the inexperience of the country and its lack of adequate cadres in this policy-area.

II. GENERAL SUGGESTIONS AND RECOMMENDATIONS

The Yemen Arab Republic considers the United Nations Conference on Science and Technology for Development an excellent opportunity for the developing countries to work out and co-ordinate their policies. The Conference should result in specific and practical resolutions promoting the establishment of a New International Economic Order based on justice and equal opportunity. Yemen also recognizes the significance of the Conference for the transfer, application and improvement of technology in the developing countries and its potential for accelerating the economic development process therein. Proceeding from these considerations and desirous of contributing to the success of the Conference, the Yemen Arab Republic submits the following recommendations:

1. Co-operation among the developing countries in the area of science and technology should be given greater substance and depth at all levels. The exchange of information and expertise among them should play a significant role in facilitating the transfer, application and improvement of technology in these countries.

2. Specific recommendations and resolutions should be adopted giving support to the national institutions and organizations devoted to the transfer of technology in the developing countries; for without their participation in the technology transfer process, the resolutions of the Conference will have no real effect in promoting the application of science and technology in the industrially retarded nations.

3. The responsibility for facilitating the adaptation and development of technology in the developing countries should lie with the industrial countries exporting their technology thereto; for in many instances the industrialized countries and their multi-national corporations have placed their investments in the developing countries with insufficient concern for the need to adapt their technological imports to local conditions,

4. Universities and scientific institutes in the developed countries should be urged to assume the responsibility for orienting the research and higher education of their students from the developing countries towards the treatment of the scientific problems and applications of the developing countries instead of leaving them to expend their efforts on advanced technological subjects geared to the affairs of the developed countries, but with no immediate application in the student's own country. The hope is that such a measure will help stem the brain-drain.

5. The United Nations should be urged to assist the developing countries in setting up specialized regional institutions devoted to the selection, transfer and adaptation of technologies appropriate to the circumstances and needs of the developing countries.

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BASIC FACTS AND STATISTICS ON THE YEMEN ARAB REPUBLIC

The Yemen Arab Republic is situated on the south-west side of the Arabian Peninsula and has an estimated area of 200,000 km^2. It is characterized by a wide variety of regional climates and elevations -- semi-desert coastal plains and mountain heights, peaks and foothills; cold, mild and hot climates. Accordingly, the different regions of Yemen are endowed with a variety of natural resources available in varying quantities.

The population of the Yemen Arab Republic was estimated at around 6.5 million people in the 1975 census. The population density was estimated at around 32 people per km^2.

While the total area of the country is around 20 million hectares, only one and a half million hectares are arable, and another two million hectares of marginal land can be cultivated once every 3-5 years on the average, depending on the size of the annual rainfall. These latter represent the boundary between the regions that enjoy regular and sufficient quantities of rainfall for agriculture and those that are completely arid.

The area* of woodland and trees is estimated at slightly over a million and a half hectares.

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* Translator's note: This is a guess from possible error in original text.

GDP and GNP at Constant Prices for the Years 1972-1973 to 1975-1976
(Million Y.R.)

Years	G D P	G N P
1972-1973	2277	2733
1973-1974	2242	2640
1974-1975	2621	3247
1975-1976	2707	3755

U.S. Dollar = Y.R. 4.55

Projected GDP for the Years of the Five-Year Plan
(1975-1976 Prices)

Years	GDP in Million Y.R.	Rate of Growth
Base: 1975-1976	5181	7.0%
1976-1977	5564	7.4%
1977-1978	5996	7.8%
1978-1979	6488	8.2%
1979-1980	7042	8.5%
1980-1981	7671	8.9%

Balance of Payments (1973-1974 to 1978-1979)
(Million Y.R.)

Years	Imports	Exports	Deficit
1973-1974	745	55	690
1974-1975	981	53	928
1975-1976	1707	51	1656
1976-1977	3035	51	2984
1977-1978*	5500	37	5463
1978-1979*	7000	60	6940

U.S. Dollar = Y.R. 4.55

* The figures for 1977-1978 and 1978-1979 are not actual but only projected figures.

Transfers by Yemeni Emigres Abroad (1973-1974 to 1978-1979)
(Million Y.R.)

Years	Amounts Transferred
1973-1974	595
1974-1975	1013
1975-1976	2363
1976-1977	4561
1977-1978	6000
1978-1979	8000

Quantitative Targets of the Education and Teaching Sector

(1976-1977 to 1980-1981)

Number of Students

Educational Level	Base Year in Thousands	Fifth Year in Thousands	Rate of Increase
Elementary	252.5	425.9	69%
Preparatory	15.6	40.3	159%
Secondary	6.5	15.6	139%
Technical	1.9	7.7	279%
University	2.3	8	248%